

REMARKS

Claims 1-39 remain pending in the present application. Claims 1-39 stand rejected under 35 U.S.C. § 103(a). Reconsideration by the Examiner is respectfully requested in light of the following remarks.

Claims 1-39 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,917,588 to Addiego (“Addiego”) in view of U.S. Patent No. 4,579,455 to Levy et al. (“Levy”) and further in view of U.S. Patent No. 6,178,223 to Solomon et al. (“Solomon”). The rejection is respectfully traversed.

A *prima facie* case of obviousness requires that the combined prior art references teach or suggest all of the claim limitations. MPEP § 2143. In the present application, the three cited references, presuming that they are combinable, do not teach all of the claim limitations of claims 1-39. Additionally, a *prima facie* case of obviousness requires the existence of some objective motivation or suggestion to combine the references. *Id.* Here, Applicant respectfully submits that the suggestion or motivation to combine the cited references is only the result of the improper use of hindsight.

Claim 1 recites a method of operating an inspection apparatus to inspect a device. The method includes the step of “inputting at least two desired images to be inspected that have been selected by a user of the inspection apparatus.” The method also includes the derivation of “a spatial relationship” between the selected scanned images. The “input desired scanned images” and the derived spatial relationship” are used to form “a pattern to be recognized on the device.” The cited prior art references do not teach these steps of the claimed method.

As noted in Applicant's prior Amendments, Addiego shows an inspection system that determines, locates and classifies defects on a wafer surface. The results of the inspection are printed, transmitted, and/or displayed on a system monitor. During wafer production, the Addiego system continuously inspects specimen wafers and looks for defects present on each specimen wafer. The Addiego system determines the presence of defects from acquired image data of a specimen wafer by analyzing the difference image of two adjacent reticle fields (Addiego at col. 8, lines 60-63). The Addiego system always analyzes the difference image of two adjacent reticle fields. Neither of the analyzed two adjacent reticle fields are input into the system based on selections of "desired scanned images" by a user.

Consequently, Addiego fails to teach or suggest each of the limitations of claim 1. Specifically, Addiego does not teach or suggest the selection of multiple displayed images based on an input by a user; Addiego instead teaches an automatic selection of adjacent reticle fields, requiring no user input. Furthermore, adjacent reticle fields do not require the derivation of a spatial relationship between the fields. Hence, Addiego does not teach the derivation of a spatial relationship. Moreover, because Addiego only *compares* two reticle fields with each other, it does not teach the use of user-selected images to cooperatively create "a pattern to be recognized from the input desired scanned images and the derived spatial relationship."

To overcome these deficiencies, the Office Action combines Addiego with Levy and Solomon. As noted in Applicant's prior Amendments, Levy shows an inspection system in which a photomask is inspected for defects by comparing pixel representations of two duplicate die patterns of the photomask. Defects are identified at those locations where the two pixel representations do not match. (Levy at col 4, lines 47-50). Levy also teaches the manual input of inspection parameters before the wafers are scanned. (Levy at col 5, lines 52-58).

Solomon relates to a three-dimensional image processing method for use with, in one aspect, transmissive x-ray data analysis. A two-dimensional image generally only has one layer of pixel data, whereas the three-dimensional images in Solomon are composed of multiple layers of pixel data. Solomon teaches the ability of a user to select two or more pixels from multiple pixel layers for processing purposes. (Solomon at col 19, lines 45-50).

Initially, Applicant respectfully submits that without improper hindsight there is no objective motivation to combine each of the three cited references. “The question of obviousness should not be decided by reference through hindsight by using the asserted claim as a guide through a maze of prior art references which combine the right references in the right ways so as to achieve the result of the invention, as defined by the asserted claim.” *General American Transportation Corp. v. Cryo-Trans, Inc.*, 93 F.3d 766, 39 USPQ2d 1801 (Fed. Cir. 1996). Here, the maze of cited references provides no support or motivation to combine the prior art. As one example, there is no suggestion to combine the three-dimensional image processing methods for use with transmissive x-ray data analysis as taught by Solomon with the wafer inspection methods taught by Addiego and Levy. Applicant also respectfully submits that the “requisite prior art suggestion to combine becomes less plausible when the necessary elements can only be found in a large number of references. . . .” MPEP § 2145. In the present application, the lack of identifiable objective motivation to combine the references, in addition to the number of references applied by the Office Action, is sufficient to overcome the asserted obviousness arguments.

In any event, the combination of Addiego, Levy and Solomon does not teach all of the claimed limitations of independent claim 1. Neither Addiego, Levy nor Solomon, individually or combined, teach or suggest “deriving a spatial relationship

between the input desired scanned images; and forming a pattern to be recognized on the device from the input desired scanned images and the derived spatial relationship.”

Addiego relates to the analysis of two adjacent reticle fields. Because the analyzed images are always in the same position relative to each other, there is no need or motivation in Addiego to derive “a spatial relationship between the input desired scanned images.” Contrary to the teachings of Addiego, the selected images of claim 1 may correspond to any of the scanned areas of the device. Hence, in the present invention, there is no limit on the spatial relationship between the selected images. Additionally, in Addiego, the adjacent reticle fields are subsequently *compared* with each other in an attempt to locate a defect in one of the reticle fields (Addiego at col 8, lines 60-67) instead of being used to form a pattern for future recognition processes, as is required by claim 1. That is, the selected images of claim 1 are not *compared* against each other, but rather are considered together to form a pattern for later comparison with other areas. In other words, Addiego does not teach the formation of a pattern from the selected scanned images, as claimed; Addiego is limited to the use of a single image as a pattern against other images. Claim 1 uses multiple user-selected images and the derived spatial relationship between them to create a pattern for subsequent comparison or recognition processes.

Similarly, Levy also does not teach the derivation of a spatial relationship between the selected images, nor the use of the selected images to form a pattern for pattern recognition processes. Like Addiego, Levy only teaches the *comparison* of two images. (Levy at col 7, lines 17-27). There is no teaching in Levy that user-selected images may be combined in a unique spatial relationship to create a pattern for later comparison.

Additionally, although Solomon is only relied upon to show user control of the process, Applicant notes that Solomon also does not demonstrate the derivation of a spatial relationship between two or more user-selected images, nor the formation of a pattern from the selected images and the derived spatial relationship. The selected areas in Solomon are, once again, *compared* with each other; they are not used together to create a pattern.

For at least these reasons, claim 1 is allowable over the cited combination. Claims 2-18 depend from claim 1 and are allowable along with claim 1 for at least the reasons given above and on their own merits.

Claim 19 recites “a method of inspecting a semiconductor wafer having objects formed therein.” Like the method of claim 1, the method of claim 19 includes the steps of “deriving a relationship” between user-selected images, and then “forming a pattern to be recognized on the wafer from the selected images and the derived relationship.”

Addiego, Levy, and Solomon, even if combined, fail to teach or suggest a method of deriving a relationship between selected images, and then using that relationship and the multiple images to create a pattern for comparison against other areas of the wafer. The cited references only teach the comparison of one area to another area, not the use of multiple areas to create a pattern for later comparison.

Additionally, claim 19 recites that the derived relationship is “determined by forming vectors in at least two dimensions between the selected images.” The Examiner is referred to Figure 6B of the present Application wherein a vector relationship between user-selected images is demonstrated. The derived vector information, combined with the selected images, is then used to create a pattern for future defect

detection purposes. In the given example of Figure 6B, the selections 250, 254 and 256, combined with the relationship between those selections (as defined by the vectors 262, 264, 266 and 268) are used to create the desired pattern. Neither Addiego, Levy nor Solomon teach or suggest the use of vectors in at least two dimensions to determine a relationship between user-selected images.

For at least these reasons, claim 19 is allowable over the cited combination. Claims 20-22 depend from claim 19 and are allowable along with claim 19, for at least the reasons given above and on their own merits.

Claim 23 recites a “method of inspecting a semiconductor device having objects formed therein.” The method includes the step of “forming a pattern to be recognized” from selected images and “a spatial relationship between the images.” The spatial relationship is “determined by forming vectors in at least two dimensions between the selected images.” Additionally, the step of forming a pattern includes the filtering out of undesired features.

As explained above in detail, Addiego, Levy, and Solomon, even if combined, fail to teach or suggest a method of forming a pattern to be recognized from a derived spatial relationship between selected images. The cited references only teach the comparison of one area to another area, not the use of multiple selected images to create a pattern for later comparison. The cited references also do not teach or suggest the use of vectors in at least two dimensions to determine a relationship between the selected images. Moreover, the cited references do not teach the filtering out of undesired features. A purpose of the present invention is to allow a user to create an overall pattern by selecting desired images to the exclusion of other undesired areas or features. (page 11, lines 21-24; page 12, lines 1-8). Determining a spatial relationship between the selected images is a step in forming a pattern for later recognition. This

step is a result of the claimed invention's ability to filter out undesired features. The cited references do not teach this ability.

For at least these reasons, claim 23 is allowable over the cited combination.

Claim 24 recites an "inspection apparatus for use in inspecting a manufacturing device used in a manufacturing process." The apparatus includes a processor that derives "a spatial relationship between the user selected images" and that forms "a pattern to be recognized on the manufacturing device from the user selected images and the derived spatial relationship."

As set forth above, the combination of Addiego, Levy, and Solomon fails to teach or suggest these limitations. For at least the foregoing reasons, claim 24 is allowable over the cited combination. Claims 25-34 depend from claim 24 and are allowable along with claim 24 for at least the reasons given above and on their own merits.

Claim 35 recites an "inspection apparatus for use in inspecting a semiconductor wafer." Like the apparatus of claim 24, the inspection apparatus of claim 35 includes a processor that derives "a spatial relationship between the user selected images" and that forms "a pattern to be recognized on the scanned wafer from the user selected images and the derived spatial relationship." Additionally, according to claim 35, the derived spatial relationship "is determined by forming vectors in at least two dimensions between the user selected images."

As set forth above, the combination of Addiego, Levy, and Solomon fails to teach or suggest these limitations. For at least these reasons, claim 35 is allowable over the cited combination. Claims 36-38 depend from claim 35 and are allowable along with claim 35, for at least the reasons given above and on their own merits.

Claim 39 recites an "inspection apparatus for use in inspecting a semiconductor wafer." Like the apparatus of claim 35, the inspection apparatus includes a processor enabled to form "a pattern to be recognized on the scanned wafer from the user selected images and a spatial relationship between the images." The derived spatial relationship "is determined by forming vectors in at least two dimensions between the user selected images."

As set forth above, the combination of Addiego, Levy, and Solomon fails to teach or suggest these limitations. For at least these reasons, claim 39 is allowable over the cited combination.

Thus, because the combination of Addiego, Levy and Solomon do not teach all of the claimed limitations of the present invention, claims 1-39 are allowable over the cited references and withdrawal of the rejection is respectfully requested.

In view of the above remarks, each of the presently pending claims in this application is believed to be in immediate condition for allowance. Accordingly, the Examiner is respectfully requested to pass this application to issue.

Dated: December 8, 2004

Respectfully submitted,

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